Bren School of Environmental Science and Management

1. **MESM 2011 Group Project Proposal**: Development of Biosecurity Plan that includes: Protocols for Prevention; Early Detection and Rapid Response; Biological and Economic Risk Assessment; Policy Recommendations; Education and Outreach; and a Cost-Benefit Analysis for the prevention and spread of invasive plants and animals on Santa Cruz Island, CA.

2. **Proposers**:
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3. **Faculty Sponsor**: Frank Davis

4. **Proposed Project**
   **Problem Statement**
   Islands are home for extraordinary and often distinctive biological diversity. Unfortunately, species native to islands tend to be especially vulnerable to adverse effects of introduced, non-native species – a fact well illustrated by the alarming rates of extinction and endangerment observed on islands. Because islands are isolated and discrete units, they also present some of the best opportunities to prevent new invasions, and to manage and restore healthy native communities and ecosystem processes to large landscapes.

   Santa Cruz Island is the largest and most biodiverse of the Channel Islands. The Nature Conservancy (TNC) owns 76% of the approximately 62,000 acre island; the National Park Service (NPS) owns the remainder. Upon acquiring its portion of the island in 1978, TNC has undertaken an ambitious restoration project to promote the ecosystem health and function of the island and to restore the viability of its threatened and endangered species.

   A key element to ongoing and lasting protection of the island resources is preventing invasions and establishment of novel invasive organisms. The suite of invasive species that concern us include forest pests such as fungi and exotic insects; exotic ants, rodents, canine and avian diseases that might harm the endemic island fox and island scrub-jay and invasive plants that compete with native plants and may result in genetic contamination. To accomplish this three components must be considered: 1) Guidelines to prevent harmful introductions and education of island users and visitors to adhere to guidelines; 2) Protocols to detect new invasive species should they arrive on island; and 3) A rapid response plan against harmful invasive organisms that do arrive on island which is compatible with protection of native biota. To that end TNC in cooperation with NPS wishes to develop a Biosecurity Plan for Santa Cruz Island that can be a model for not only other California Channel Islands but for islands worldwide.

   **Project Objectives**
   To develop and enact an effective biosecurity plan for Santa Cruz Island, the group must address four components of human/island interaction and invasive species biology:

   1) **Risk Assessment**: Identify the pathways and vectors of potential invasive organisms. For each vector identify the likely invasive threats. Determine if the risks are associated with specific geographic locations or seasons and how might that affect responses. Rank the order of threats and how prevention efforts should be distributed. Identify most likely dispersal patterns of new invaders on the island using GIS-based modeling to allow land managers to most effectively respond to threats.

   2) **Plans and Recommendations**: Compile vector-specific biosecurity protocols and implementation plans that involve participation by partners (e.g. University of California, Santa Cruz Island Reserve, Island Packers). Develop Early Detection protocols to identify presence of new invasive species. Develop a Rapid Response plan to address invasives that arrive and establish on island. Complete a biological assessment of the potential effect of Response actions on threatened, endangered, and endemic plants and animals and
develop mitigations to minimize ecological impacts. Develop prevention protocols based on identified risks and tailor recommendations to specific groups of visitors (e.g. campers, contractors, staff, day visitors, boaters, researchers).

3) Education and Outreach: Research the most effective messaging for a wide range of island visitors and users. Conduct attitudes and awareness survey of island visitors to assess their willingness to comply with and pay for biosecurity measures. Implement targeted messaging that may include signs, brochures, videos to be shown on Island Packers’ boats, and presentations for community and conservation groups such as Audubon, California Native Plant Society, NPS Volunteer Corp and yacht clubs. Present a critique and recommendations for an on-going outreach program including the feasibility of using non-TNC staff to run such a program.

4) Cost/Benefit Analysis: Determine what TNC and NPS may potentially lose, both biologically and economically, if a Biosecurity Plan is not implemented. Calculate the cost of preventing invasive species arrival by implementing this Biosecurity Plan compared to managing an invasive organism once it has arrived or established on island.

Project Significance
Santa Cruz Island and the other California Channel Islands, while home to many unique species of plants and animals, also showcase “legacy landscapes” that are representative of what much of Southern California looked like many hundreds of years ago. It is important to preserve the native natural history of Southern California for future generations. Due to its relative isolation, Santa Cruz Island provides one of the best opportunities for preserving native ecological communities. To maintain this historical landscape, we must reduce the threats posed by invasive species introductions. All Channel Islands visitors along with island land managers (TNC and NPS) and other stakeholders (e.g. California Invasive Plant Council) will benefit from the directed efforts to increase the biosecurity of Santa Cruz Island through a written set of plans and protocols that can be exported to other programs.

Background information:
Santa Cruz Island is located 22 miles off the coast of Santa Barbara County and is a part of Channel Islands National Park. (See map in Appendix.) The island is 96 square miles in size and has 77 miles of coastline. The National Park Service owns and manages 24% of the island while the other 76% is owned and managed by The Nature Conservancy as a preserve. Both NPS and TNC share a common mission to protect native species and ecosystems from non-native threats.

In the past, a variety of non-native plants and animals were introduced to the island, either accidentally or intentionally for ranching and agriculture. To date NPS and TNC have invested a great deal of resources to remove feral ungulates (sheep, cattle, pigs) and invasive weeds from the island and stabilize imperiled native plant and animal populations (such as the federally endangered Santa Cruz Island fox). Non-native invasive plant species and Argentine ants are two of the worst threats on the island today. Many non-native species such as Sudden Oak Death pathogen, rats, red imported fire ants are already present and causing great damage on the California mainland are not present on Santa Cruz Island and could cause extensive and irreversible damage if introduced and allowed to establish. Elimination of non-native rats from Anacapa Island cost approximately $3 million. It may be impossible to eradicate rats, or many other new invaders from the far larger and more rugged Santa Cruz Island unless the invasion is caught early before the species is widespread.

While there are some biosecurity measures put in place by the National Park Service, compliance is not universal and extends no further than the NPS staff and boats. Thus, Santa Cruz Island requires a comprehensive, effective biosecurity plan. With strong biosecurity measures in place, we hope to sharply reduce the number of invasive plant and animals reaching and becoming established the island, so that damage to native species is prevented and the costs of invasive species removal can be significantly reduced.

Stakeholders
As co-owners and managers of Santa Cruz Island, the primary stakeholder besides TNC is the National Park Service’s Channel Islands National Park. NPS staff will collaborate with TNC and Bren students to
create a plan that has application to all Park islands. There may be an opportunity to collaborate with the California Invasive Plant Council to craft a plan and protocols that are applicable throughout the state.

**Possible approaches and Available Data**

We envision the following timeline as an approximate sequence to guide the students through the project. Spring 2010 will begin with a student orientation to familiarize the students with the Santa Cruz Island Restoration effort and current bio security practices. During this period, students will develop a project plan that will outline the project parameters and identify appropriate models and methods for achieving risk assessment and cost benefit analysis goals. There is a wealth of invasive species literature from around the world (see examples in Appendix). Students will review and adapt appropriate elements of proven biosecurity programs. During the Summer 2010, depending on funding for internships, students will develop and implement trial education and outreach programs, conduct public opinion surveys, and gather public reactions to the given trial programs. In Fall 2010 and Winter 2011 students will refine invasive dispersal models, risk assessments, cost benefit analysis, and education / outreach programs and create the final Biosecurity Plan.

TNC will provide available GIS data to assist with this study, which includes: 1m aerial imagery, topography, road networks, vegetation class layers, and current invasive plant layers to name a few. TNC staff in the Ventura Field Office will be available for consultation and cooperation on this project as will selected staff from NPS Channel Islands National Park. Additionally, we are in contact with and will consult conservation managers in New Zealand who have created and implemented island biosecurity plans for island conservation areas. We would expect to have frequent contact by phone, email and in-person meetings throughout the duration of this project.

**Deliverables**

We expect the final written report will contain the Biosecurity Plan described above. In order to write and enact the recommendations laid out in the Plan, students will need to visit our island partners to elicit input and incorporate concerns about implementation of invasive species protocols. Additionally the students will need to conduct educational outreach visits to determine the efficacy of their targeted outreach plan. They may be required teach island volunteer groups to implement the education program, so that the education outreach will continue after the students have finished this project. At the start of the project TNC will work with the students to lay out a schedule of the required field work.

5. **Client:**
Dr. John Randall and the Santa Cruz Island Program Staff
The Nature Conservancy, 3639 Harbor Blvd., Suite 201, Ventura, CA 93001, (805) 642-0345

6. **Client Commitments:** See attached letter and # 7 and 8 below.

7. **Anticipated financial needs:** The Nature Conservancy may be able to provide up to $10,000 for interns and supplies, contingent on approval by the state agency providing funds for this work. The National Park Service will be able to provide up to $5,000 for an intern to develop a Biosecurity and Rapid Response Plan.

8. **Internship Opportunities:** Possible internship for 1 or 2 students to facilitate education and outreach program. Internship is contingent of approval by State Coastal Conservancy who is providing funding for this project.
APPENDIX:

Map of Santa Cruz Island

Examples of Invasive Species Literature:


Howald G., Creel E. Non-native species prevention plan for the Channel Islands National Park, California. Island Conservation, University of California Santa Cruz, California.


